

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Industry Webinar

Modifications to PRC-025-1

August 16, 2017

RELIABILITY | ACCOUNTABILITY



- Presenters
 - Standard Drafting Team
 - Chair, John Schmall, ERCOT
 - Vice Chair, Mike Jensen, PG&E
 - NERC Staff
 - Scott Barfield-McGinnis
- Administrative Items
- Background
- Revisions
- Q & A Session

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A map of North America is shown in the background. The United States and Canada are in a light blue color, while Mexico is in a light gray color. A dark blue banner with a downward-pointing arrow on its right side is positioned at the top of the page. A horizontal blue banner with white text is centered across the map.

Administrative Items

- It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition. It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

- **Public Announcement**
 - Participants are reminded that this meeting is public. Notice of the meeting was widely distributed. Participants should keep in mind that the audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders
- **Presentation Material**
 - Information used herein is used for presentation purposes and may not reflect the actual work of the official posted materials
- **For the official record**
 - This presentation is not a part of the official project record
 - Comments must be submitted during the formal posting

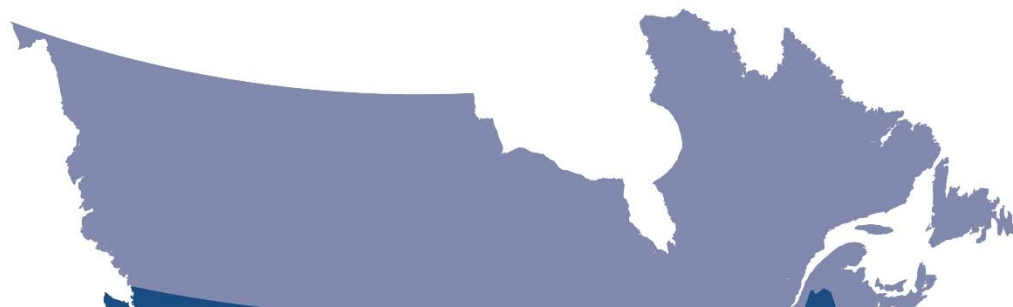
Standard Drafting Team Roster

Member	Entity
John Schmall, Chair	Electric Reliability Council of Texas, Inc.
Mike Jensen, Vice Chair	Pacific Gas and Electric Company
Juan Alvarez	Caithness Energy
S. Bryan Burch, P.E.	Southern Company
Walter Campbell	NextEra Energy Resources, LLC
Jason Espinosa	Seminole Electric Cooperative, Inc.
Charles Yeung, PMOS Liaison	Southwest Power Pool, Inc.
Scott Barfield-McGinnis, PE	North American Electric Reliability Corporation
Lauren Perotti, Counsel	North American Electric Reliability Corporation

- Informal discussion
 - Via the Q & A feature
 - Use chat speak with the host
 - Respond to stakeholder questions
- Help the team facilitate chat questions by
 - Prefacing comments with “Comment:”
 - Prefacing questions with “Question:”
- Other
 - Some questions may require future team consideration
 - Please reference slide number, standard section, etc.
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Background



- Approval - FERC Order No. 799 on July 17, 2014
- Effective on October 1, 2014
- Enforcement on October 1, 2019 (settings only)
- Enforcement on October 1, 2021 (Retire/Replace equipment)
- Issues revealed during implementation:
 1. Need alternative loadability option(s)
 2. Address whether IEEE 50 device element is in or out
 3. Clarify Table 1 applications where there is more than one
 4. Need alternative option where the interconnecting transmission line impedance may be a factor
 5. Consider an alternative to the term “pickup setting”
 6. Clarify identified miscellaneous items

- Purpose statement
- Applicability
- Requirement
 - Except version reference
- Measure
- Violation Severity Levels

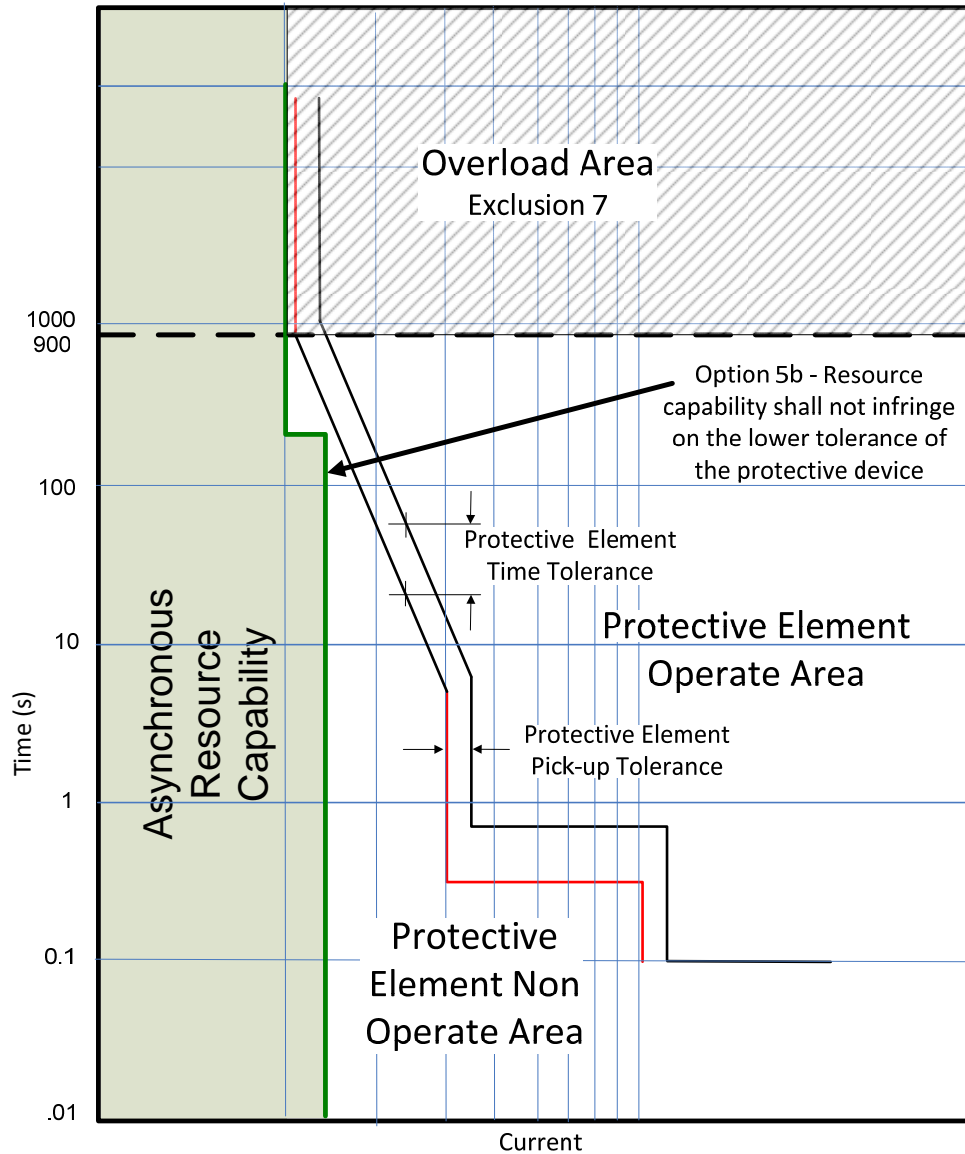


Revisions



Table 1. Relay Loadability Evaluation Criteria

Application	Relay Type	Option	Bus Voltage ⁴	Pickup -Setting Criteria
Asynchronous generating unit(s) (including inverter-based installations), including or Elements utilized in the aggregation of dispersed power producing resources	Phase time overcurrent relay (e.g., 50, 51,) or (51V-R) – voltage-restrained)	5a	Generator bus voltage corresponding to 1.0 per unit of the high-side nominal voltage times the turns ratio of the generator step-up transformer	The overcurrent element shall be set greater than 130% of the calculated current derived from the maximum aggregate nameplate MVA output at rated power factor (including the Mvar output of any static or dynamic reactive power devices)
		OR		
		5b	<u>Generator bus voltage corresponding to 1.0 per unit of the high-side nominal voltage times the turns ratio of the generator step-up transformer</u>	<u>The protection element shall not infringe upon the resource capability (including the Mvar output of any static or dynamic reactive power devices) with worst case documented tolerances applied between equipment capability and the protection element (see Figure A).</u>



Setting Criteria

The protection element shall not infringe upon the resource capability (including the $Mvar$ output of any static or dynamic reactive power devices) with worst case documented tolerances applied between equipment capability and the protection element (see Figure A).

Table 1. Relay Loadability Evaluation Criteria

Application	Relay Type	Option	Bus Voltage
Synchronous generating unit(s),	Phase time overcurrent relay (e.g., 50, 51, or 51V-R) – voltage-restrained)	2a	Generator bus voltage corresponding to 0.95 high-side nominal voltage turns ratio of the generator transformer
		OR	
		2b	Calculated generator bus voltage corresponding to 0.85 nominal voltage on the terminals of the generator transformer (including transformer turns ratio and impedance)



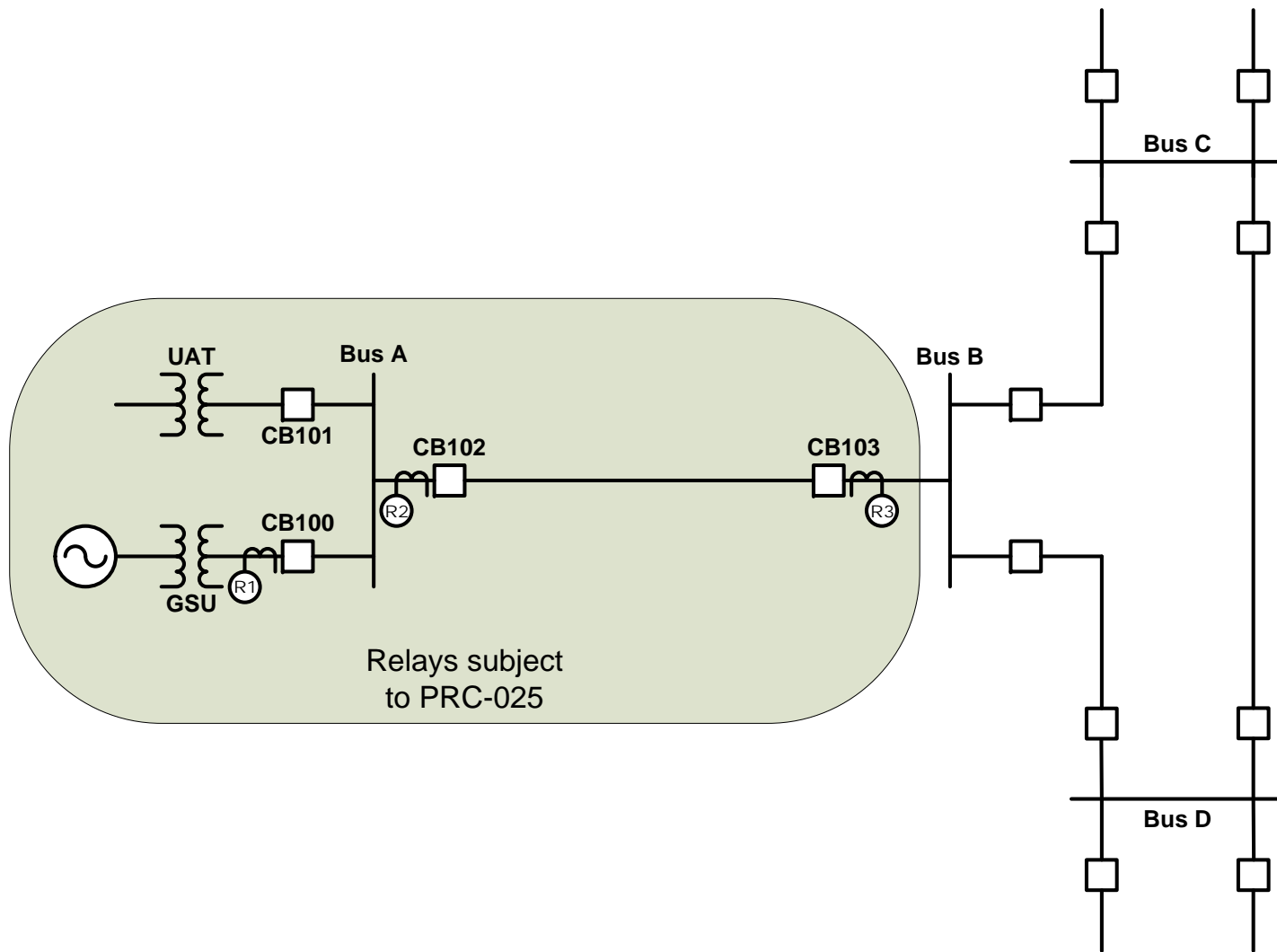
Table 1. Relay Loadability Evaluation Criteria

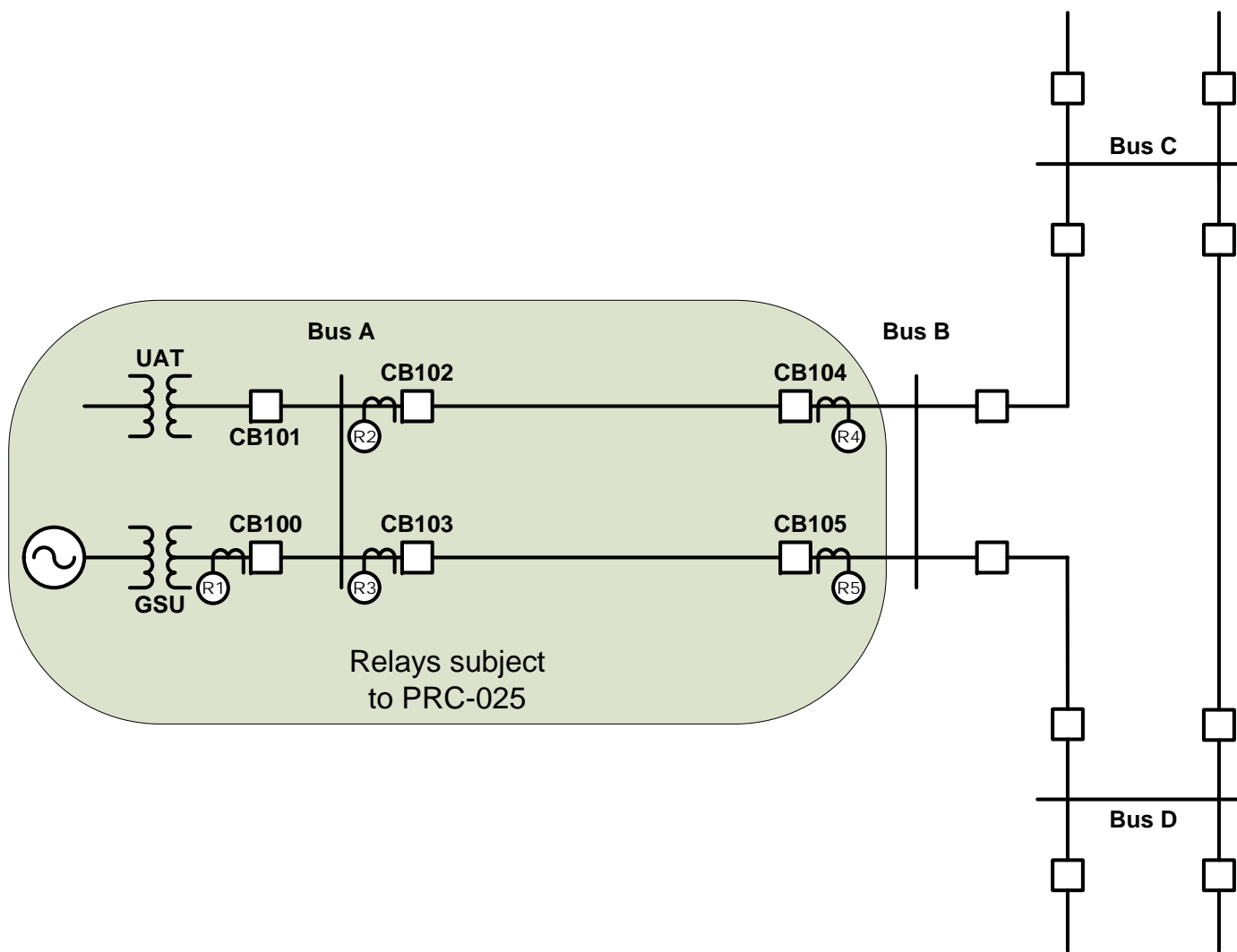
Application	Relay Type	Option	
Asynchronous generating unit(s) (including inverter-based installations), including or Elements utilized in the aggregation of dispersed power producing resources	Phase distance relay (<u>e.g.</u> , 21) – directional toward the Transmission system	4	G cc hi tu tr
	Phase time overcurrent relay	<u>5a</u>	G cc hi tu tr



Loadability Evaluation Criteria

Relay Type	Option	Bus Voltage	
Phase distance relay (e.g., 21) — directional toward the Transmission system — installed on the high-side of the GSU transformer <u>and on the remote end of line</u>	14a	0.85 per unit of the line nominal voltage <u>at the relay location</u>	The impedance (1) Real MW represented (2) Reactive MW value at rated
OR			
If the relay is installed on the generator side of the GSU transformer use Option 7	14b	Simulated line voltage coincident with the highest Reactive Power output achieved during field forcing in response to a 0.85 per unit nominal voltage <u>on the high-side terminals of the generator step-up transformer at the remote end of the line</u> prior to field forcing	The impedance (1) Real MW represented (2) Reactive MW maximum by simulation



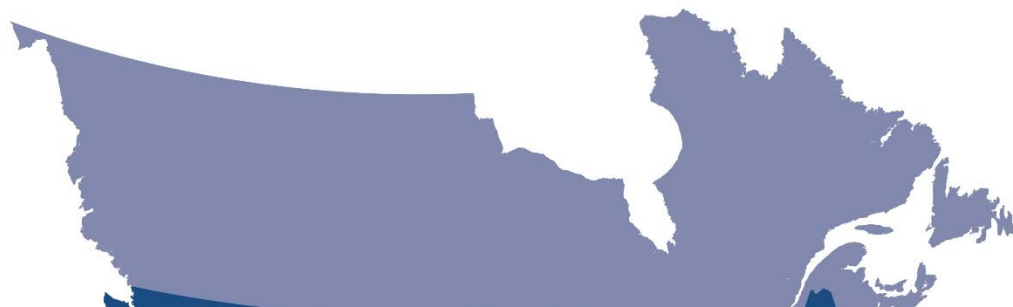


Age ⁴	Pickup-Setting Criteria
per unit of the age times the generator step-up	<p>The impedance element shall be set less than the calculated impedance derived from 115% of:</p> <ul style="list-style-type: none"> (1) Real Power output – 100% of the gross MW capability reported to the Transmission Planner, and (2) Reactive Power output – 150% of the MW value, derived from the generator nameplate MVA rating at rated power factor

- IEEE C37.17-2012 & IEEE C37.2-2008
- Asynchronous Generator Performance
 - Asynchronous generators, ~~however, do not have excitation systems and~~ will not respond to a disturbance with the same magnitude of apparent power that a synchronous generator will respond.
- Synchronous generator...
 - ...the maximum capability shall be used for the purposes of this standard as a minimum requirement. The Generator Owner may base settings on a capability that is higher than what is reported to the Transmission Planner.
- Asynchronous generator...
 - If different seasonal capabilities are reported, the maximum capability shall be used for the purposes of this standard as a minimum requirement. The Generator Owner may base settings on a capability that is higher than what is reported to the Transmission Planner.

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Questions and Answers



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- Initial comment period
 - 45-Days
 - Initial Ballot (August 29 – September 7, 2017)
- Respond to Comments
 - Meeting at Atlanta, GA| September 26-28, 2017
- Point of contact:
 - Scott Barfield-McGinnis, Senior Standard Developer
 - Scott.Barfield@nerc.net or call 404-446-9689
- Webinar posting
 - Within 48-72 hours

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Industry Webinar Has Ended

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